

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for

SOIL CONSERVATION SERVICE RESEARCH**
SEPTEMBER 1950

EROSION CONTROL PRACTICES DIVISION

Spanish Peanuts Yield well in 2-Year Rotation on Class II Land -
B. H. Hendrickson, Watkinsville, Georgia. - "Mr. W. E. Adams reports that Spanish peanuts yielded well on Class II land, Cecil sandy loam soil, when grown in a 2-year rotation with oats and vetch, and volunteer crotalaria over a 7-year period. The winter companion cover crops of oats and vetch were harvested in the spring for hay. In the stubble, Crotalaria spectabilis, early variety, volunteered. The crop residues were turned under the following spring. The peanut crop that followed was harvested for nuts and hay.

"Other cropping practices tested over the same period, 1944-50, were continuous peanuts, and peanuts grown annually with vetch fall-sown for spring green manure. Peanuts grown in neither of these practices yielded as well as in the 2-year rotation, which featured the use of summer and winter cover crops for production of both hay and crop residues.

"Average peanut yields in the 3 practices, follow:

<u>Method</u>	<u>Av. yield/ac. of Peanuts</u>
No. 2 Continuous peanuts	918.2 lbs/ac.
No. 4 Peanuts - vetch (for green manure)	1010.8 lbs/ac.
No. 12 (1) Oats-vetch (hay) - crotalaria (residue) (2) Peanuts	1650.7 lbs/ac.

Poor Wheat Stand Increased Weeds and Reduced Annual Lespedeza -
D. D. Smith, Columbia, Mo. - "Slow fall growth and winter damage to wheat last season reduced production from Korean lespedeza this summer. Wheat was thin in the spring, permitting annual weeds to become established and compete with the lespedeza. In combination with wheat for grain, lespedeza produced 73 pounds of beef per acre by September 15, compared with more than 250 pounds in 1949. Following wheat grazed-out, lespedeza made 130 pounds by September 15, compared with 205 pounds last year."

* This report is for in-Service use only and should not be used for publication without permission from the Washington Office, Soil Conservation Service Research.

** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Potato Yields as Influenced by Rotations and Supplemental Irrigation -
O. R. Neal, New Brunswick, N. J.-"Potato yields from continuously cultivated areas and from two conservation rotations, all with and without supplemental irrigation, are shown in the following table.

Vegetable Research Farm - 1950		
Cropping System	Bu. of No. 1's per Acre	
	Irrigated	Unirrigated
Continuous cultivation	301	290
2-year rotation with wheat and clover seeding	353	330
3-year rotation with wheat and clover	330	319

"Irrigation occurred whenever moisture tension at a 6-inch depth reached a value of 20 inches of Hg. Five irrigations were made during this growing season. The yields show only a slight increase as a result of added water. Differences between rotations, while greater than those due to irrigation, are also comparatively small. This has been generally true throughout the period of operation of these plots. Yield increases due to rotation have been smaller for potatoes than for tomatoes, sweet corn and several other crops of the area. This results in part from the heavy traffic of tractors and sprayers during the potato growth period. These plots are operated with a 2-row cultivator and a 4-row sprayer. Thus each row middle is subjected to heavy wheel traffic at repeated intervals during the season. Differences in soil physical conditions, induced by the rotations, tend to be eliminated under this traffic. Field measurements of soil porosity, in the plant rows, showed significantly higher values on the rotated plots than on continuously cultivated areas. Soil porosity in the row middles, however, was low in all cases and not greatly different between the rotated and continuously cultivated plots. Since the middles account for nearly 50 percent of the soil area, this compacting effect appears to be a factor influencing the yields obtained."

Preliminary Report on Performance of Experimental Potatoes
Harvester - J. W. Slosser, Orono, Maine.-"Harvesting operations, on the research farm, were started September 10 and completed September 19. The yield data has not been calculated for specific areas as yet, but, overall yield was very good and the quality excellent. This is the first crop on the new farm and treatment comparisons will be limited.

"The experimental harvester was operated throughout the harvest period. The machine performed very satisfactorily. Three functional units of the machine were exceptional. These were the shovel, elevating apron and top remover.

"The shovel is one of a series of spades developed by the project in an effort to overcome the difficulties encountered with the conventional shovel used on potato diggers. These are mainly stoppages caused by stones, improper feeding of row onto the apron, causing loss of tubers,

and stoppages caused by tops. The new shovel eliminates the above difficulties. The share is essentially one right and one left plow share with an open center and rigid vine fenders.

"The elevating apron used this year is a slight modification, in assembly, of the conventional apron. Cross bars of the apron are assembled so that only every third bar is deflected upwards instead of alternate up and down bars. This permits greater separation and carrying capacity and reduces roll back. Consequently, the apron speed can be reduced which, in turn, reduces tuber bruising. The top remover was tried for the first time this season. This device consists of a raddle with rigid cross bars and flexible, articulated, longitudinal members. The device, as developed by the project, has a segmented roller to remove potatoes which cling to the vine. This device operated almost perfectly and eliminates one man on the machine. The harvester, as it now stands is in my opinion, ready for production requiring only minor construction alterations to meet the most exacting requirements.

"A complete report of the harvester test is being prepared and should be ready sometime in November."

Tobacco Yield and Values in Relation to Winter Covers and Turning Dates for the 1949 Season - C. S. Britt, Beltsville, Md.

Tobacco yield, price per pound, and per-acre value as affected by early and late turning of various cover crops - Beltsville, Maryland, 1949.

Covers	Yield per Acre		Price per Lb.		Value per Acre	
	Early	Late	Early	Late	Early	Late
None	938	920	60.2	56.3	565	518
Ryegrass	1073	931	59.0	59.4	633	553
Vetch	1202	1508	57.8	52.6	695	793
Mixtures:						
Wheat-vetch	1101	1495	58.8	57.1	647	853
Rye-vetch	1529	1671	60.0	59.1	917	987
Ryegrass-vetch	1406	1732	61.2	61.6	860	1067
Average	1345	1633	60.1	59.3	808	969
Grand Average	1221	1364	59.3	58.0	724	791

"The tobacco yields and values are all unusually good, considering the dry season. These data show some important facts which may be summarized as follows;

1. Ryegrass alone gave only a moderate increase in crop yield and value over no cover crop.
2. Late turning of the ryegrass caused some reduction in crop yield and total value.

3. Vetch alone greatly increased the crop yield when turned late; however, the quality of the tobacco was poor.
4. Vetch grown in mixtures with wheat, rye, or ryegrass, gave heavy yields of high quality tobacco. Late turning of these mixtures gave better yields, but in some cases the quality was slightly poorer. The quality may have been hurt by having too much vetch in the mixture."

Nitrates following Winter Cover Crops used for Soil and Water Conservation - R. C. Dawson, College Park, Md. "Plots of this series have been used for a number of years for growing 1-year rotations of tobacco and cover crops. The tobacco was grown on ridges. The cover crops used were ryegrass alone, vetch alone and vetch with rye, with ryegrass and with wheat. Fallow plots which contained some weeds were included for comparison. The effect of early (April 21) and late (May 23) plowing under of the cover crops was studied. Samples were taken at 1 foot depth intervals to a depth of 3 feet at approximately biweekly intervals during the time the tobacco was in the field (June 12 to August 11).

"Less controlled variation was encountered during the sampling period in plots in which the cover crops were plowed on May 23 than in plots that were plowed earlier (April 21). Nitrate distribution with respect to depth was affected to a much greater extent after late than after early plowing. After late plowing of the cover crops the nitrate content of the top foot of soil tended to be greater after early plowing, while that of the second and third foot samples were less than after early plowing. The depth effect was greater where highly nitrifiable materials (vetch and vetch-grass mixtures) were used than where ryegrass alone was used, and was more pronounced during the earlier sampling dates than it was toward the end of the growing season. The practical significance of this lies in the fact that late plowing of the highly nitrogenous cover crops was more favorable to the maintenance of a high level of available nitrogen in the top foot of soil than early plowing. After early plowing there was more of a tendency for the nitrates to move out of the top foot and into the second and third foot depths. After late plowing the nitrate level was maintained at a relatively high level in the top foot of soil until the latter part of July after which there was a large decrease due to the requirements of the tobacco crop. The second foot of soil, although much lower in nitrates at all times than the top foot, showed very little fluctuation throughout the season. The third foot of soil remained at a constant nitrate level, slightly below that of the second foot, during June and July but showed an increase in August. The behaviour of the first foot sample was opposite to that of the third foot sample. These results strongly suggest that between July 28 and August 10 (the last 2 sampling dates) the tobacco plants had drawn heavily on the last sizeable source of nitrogen which was that of the top foot of soil most remotely situated from the plant (samples were taken midway between plants). By the same process of reasoning plant feeding was much less in the second foot of soil, which remained practically constant in nitrate content and still less in the third foot of soil which showed an increase in nitrates. The mean nitrate content of the soil during the growing season where ryegrass was plowed under was greater after early plowing than after late plowing. Where vetch or vetch-grass mixtures were plowed under maximum mean nitrates were obtained by late plowing. These results indicate that under the conditions of the experiment early plowing was more favorable to the maintenance of nitrates during the growing season than late plowing where non-legumes are concerned, whereas late plowing resulted in a higher mean nitrate level where highly nitrogenous crops were used."

Summary of Studies of Fields Subject to Wind Erosion in East Central Kansas During the Spring of 1950 - A. W. Zingg, Manhattan, Kansas.-
"A report on studies of fields subject to wind erosion in the spring of 1950 in East central Kansas was completed, in preliminary form during the month. A short summary of the findings was as follows:

1. The occurrence of wind erosion near Salina and McPherson, Kansas, in March, 1950 was found to be due primarily to the lack of sufficient vegetative cover over the ground. Wherever the amount of crop or crop residue on the surface was equal to a ton or more per acre no erosion occurred.
2. Virtually all of the fields affected by wind erosion had a more pulverized soil structure than the adjacent noneroded fields. This lack of structure contributed, at least in part, to greater erodibility by wind.
3. The eroded fields were not limited to any particular soil texture, water-stable structure, or total organic matter content.
4. On the average, about 0.85 inch of topsoil was removed from fields affected by wind erosion. It is estimated that about three-quarters of this amount was piled up into drifts in the vicinity of the eroding fields; the rest, mainly as dust ranging up to 0.1 mm. in diameter, was lost to the atmosphere.
5. The occurrence of wind erosion on the loess soils studied caused virtually no change in organic matter content or in texture of the residual soil. Virtually all of the soil constituents moved away with the wind. On soils derived from sandstone, on the other hand, a marked sorting action was associated with removal of soil by wind. On these soils, the finer constituents, especially the silt and the organic matter, was carried away, leaving the sand behind. Thus, the sand content of the residual soil was increased on the average by 26 percent due to a few windstorms.
6. The removal by wind of fine constituents from some soils constitutes one of the most serious aspects of wind erosion. The sorting process adds to the general sandiness of the affected area and to a consequently irreparable depletion of soil productivity."

Contour Farming Did not Affect Annual Tile Flow - C. A. Van Doren, Urbana, Illinois.-"The average annual tile flow from the contour farming plots was as follows:

Plot 1 - contoured	1.35 inches
Plot 2 - Non-contoured	1.59 inches
Plot 3 - non-contoured	1.39 inches
Plot 4 - contoured	1.43 inches

"Contour farming had no apparent influence on quantities of tile flow. Plot 1, a contoured plot, had the least average annual flow of 1.35 inches, while plot 2, a non-contoured plot, had the greatest average flow of 1.59 inches. The tile on plots 1 and 2 were at almost identical depths, although plot 2 was installed in 1905 on a slightly steeper grade. The tile on plots 3 and 4 were installed in 1905 at an average depth of 10-14 inches deeper than the tile on plots 1 and 2. It was originally expected that the greater flow would come from the deeper tile, namely 3 and 4, but this has not been the case.

Water Conservation for Wheat Production has been Studied at the Wheatland Conservation Experiment Station, Cherokee, since 1939 - Harley A. Daniel, Guthrie, Oklahoma.-"The results show that a combination of practices are needed to conserve the maximum amount of water. Moisture conservation is so important on deep permeable soils of the area that terraces should be designed for this purpose. And the cultivation and cropping systems should be planned to uniformly distribute and economically use the rainfall to produce crops and protective cover.

"Many soils are beginning to respond to commercial fertilizers. The importance of phosphorous fertilizer and legumes are well emphasized in the following table. The increased production of straw eventually adds more organic matter and develops a better land cover. The wheat receiving phosphorous made a more rapid growth in the spring at the time when erosion was more severe and matured earlier. The legume residue also produces a valuable mulch and saves water.

Effect of Fertilizer and Winter Legumes on the Yield of Wheat
at the Wheatland Conservation Expt. Sta., Cherokee, Okla.

Treatment ^{1/}	Yield per acre	
	Straw Tons	Grain Bu.
Commercial Fertilizer ^{2/}		
Check	0.92	14.7
Superphosphate	1.15	18.4
Superphosphate and ammonium nitrate	1.52	23.2
Fertilizer & Legumes ^{3/}		
Check	0.89	13.2
Wheat following winter peas	1.04	16.2
Wheat following winter peas & superphosphate	1.30	19.0
Wheat, winter peas and superphosphate	1.01	18.4
Wheat, vetch and superphosphate	1.09	19.2

^{1/} Annual rate per acre of superphosphate was 250 pounds per acre and ammonium nitrate, 100 pounds per acre.

^{2/} Average-5 years.

^{3/} Average 4 years for peas and 2 years for vetch.

"But, it appears that for best results the rate of fertilizer applications must be regulated by the amount of available water. In selecting the crops to be planted in a rotation, stress must be placed on the soil moisture relations and their value in maintaining a vegetative cover. Raw organic matters, particularly in the form of crop residues, are helpful. They influence the physical properties of the soil and also have a mechanical effect which saves soil and water."

Soil Moisture Loss in Relation to Cover Crops and Tillage Practice - C. J. Whitfield, Amarillo, Texas. - "Plots of hairy vetch and Austrian winter peas were seeded on fallow land on October 15, 1949. An additional plot was left in fallow for comparison purposes. On June 14, 1950 the plots were divided and cultivated, one-half with the oneway plow and the other with the sub tillage machine. Additional cultivations to kill weeds were made by sub tillage on all plots on July 17 and August 8. Soil moisture samples were taken on September 20, 1950. Considerable differences in the amount of available water in the upper 4 feet of soil were noted, depending upon whether the residue was covered by the oneway plow at the initial cultivation or left on the surface by the sub tillage machine.

"There was not a great deal of difference in the amount of moisture lost from the soil to the two crops, the deficits ranging from .78 to 1.08 inches of available water. In all cases, the plots which were sub tilled at the initial operation had more available water than the corresponding ones which were onewayed, the advantage ranging from .65 to .97 inches of available water.

Inches of available water in top 4 feet of soil of winter legume plots

Plot	Initial tillage	Available water upper 4 ft. soil Inches	Water lost to crop Inches
Hairy vetch	Oneway	4.61	.78
Austrian winter peas	Oneway	4.34	1.05
Fallow	Oneway	5.39	-
Hairy vetch	Subtillage	5.26	1.08
Austrian winter peas	Subtillage	5.31	1.04
Fallow	Subtillage	6.34	-

Weed Control Studies - "Plant count on bindweed plots where three treatments of 1 pound of 2,4-D acid per acre of the isopropyl ester have been made during the last year, showed a 32 percent reduction in number of bindweed plants. The treatment applied in October of 1949 was the most effective of the three.

"Drilled sorghums, used as a competitive crop on some of the bindweed plots, was harvested during September. Yields per plot varied from 600 to 800 bundles per acre. The variety used was a Kafir-Sumac cross, drilled at 8 to 10 pounds per acre. A check on these sorghum plots showed that none of the bindweed bloomed during the growing season. An 18-24 inch sorghum stubble was left on the plots to prevent soil and water erosion."

Stubble Beater Followed by Sweep Produced most satisfactory Mulch Seedbed Condition for Wheat on Sweet Clover Land - G. M. Horner, Pullman, Washington.-"Most of the tillage operations on the sweetclover mulch studies were completed. Second year growth of sweetclover at the early bloom stage was treated with the following operations:

1. Moldboard plow (complete coverage)
2. Sweep
3. Stubble beater followed by sweep
4. Mower followed by sweep
5. Off-set disk followed by sweep

"The treatment consisting of the stubble beater and the sweep produced the most satisfactory mulch condition from the standpoint of seedbed preparation work for winter wheat. The stubble beater, which consisted of a rotating cylinder with attached lengths of wire cables and steel cutters, left the top growth in small pieces. Very little additional work will be required prior to seeding wheat this fall. Also, the operation of the sweep was greatly facilitated by the prior use of the stubble beater.

Soil and Water loss in Relation to Cropping Practices with Wheat - "Following is a summary of the erosion losses during the early spring months. This runoff occurred after the soil had thawed and was caused by rain on wet soil.

Erosion Losses from Crop Rotation Plots at Pullman,
Washington - Feb.-March, 1950

Treatment	Feb. 24 to Mar. 22*	
	Runoff (Ins.)	Erosion (T/A)
Alfalfa & grass (2 yr. old stand)	0.00	0.6
Standing wheat stubble	0.00	0.0
Wheat after alfalfa & grass	0.17	0.9
Wheat after wheat (2nd yr. after alfalfa)	0.15	0.8
Wheat after sweet clover & grass	0.21	2.4
Wheat after peas (4th yr. after alfalfa)	0.62	4.7
Wheat after peas (3rd yr. after clover)	0.81	5.4
Wheat after peas (wheat-pea rotation)	1.00	8.1
Wheat after summer fallow	1.22	11.5

All runoff after February 24 was caused by rain on unfrozen soil with no snow cover. Erosion losses were more closely correlated with the treatments than during the previous period when the soil was frozen. Total precipitation from February 24 to March 22 was 4.03 inches."

Newly Developed Plow shows Promise for Handling Crop Residues -
G. R. Free, Marcellus, New York.-"The yield of oats and barley on turn plowed plots was 51 bushels per acre. The yield on plots prepared with the newly developed plow which leaves crop residues on the surface was 49 bushels per acre. This difference is not significant. The disked plots yielded only 34 bushels per acre. Penetrometer studies made just after planting showed that the new plow produces a seedbed just as loose as turn

plowed whereas the disked plots were much more compact. Studies made this summer show that concentration of residues at the surface pays off in terms of both aggregate stability and soil moisture."

A Big Crop of Cherries under Sod Cover - E. A. Carleton, Geneva, New York. - "Data on yield of sour cherries have been determined. Yields compared to previous seasons were as follows:

Average Yield Per Tree, Montmorency Cherries, Pounds

Cover Crop Seeded August 31, 1944	Before Treatment 1943-1944	After Treatment		
		1945-1947	1948-1949	1950
Field Brome	35.3	43.8	61.1	123.9
Perennial rye grass *	30.8	41.3	70.7	108.6
Brage orchard grass	33.2	42.2	58.8	143.7
Creeping red fescue	42.6	45.6	56.9	130.4
Tall fescue	41.8	45.7	35.0	116.8
Kentucky bluegrass	36.6	39.4	37.1	142.0
Ladino clover **	33.6	36.1	36.0	128.7
Birdsfoot trefoil ***	37.4	39.5	52.5	119.5
Cultivated	35.9	45.3	50.9	75.7

* Cover contains other grasses and weeds

** Cover mostly grass

*** Cover largely grass but legume increasing

"The original planting, set in 1934, contained 108 trees. In 1943 four trees were missing from unknown causes. A recent survey for trunk damage has shown that ten trees are partly girdled at the base by mice. Three of the ten trees were damaged before 1947 and of the seven having mouse damage since 1947, two have died during the past year, being 100% girdled. To prevent further damage from mice, sod and soil to a depth of 3" and a distance of 18" around the trees have been removed and replaced with gravel. This required about 1-1/2 bushels of gravel for each tree. This treatment should control mouse girdling. Poisoning may be used as a supplemental control. Hardware cloth, 2 mesh to the inch, placed around the base of trunks in an adjacent orchard did not prevent this damage."

Renovating Pastures on Steep Slopes - O. E. Hays, LaCrosse, Wisconsin. - "Subsurface tillage with field cultivators or big diggers will leave much of the grass residue on the surface which is very effective in reducing soil losses. However, this residue alone is not sufficient to allow one to renovate long steep hillsides without excessive erosion.

"During the fall of 1949, the untterraced pasture watershed was tilled twice with the Graham-Hoeme plow to kill vegetation and once to work in lime. This was sufficient tillage to kill existing vegetation which consisted largely of bluegrass. One tillage in the spring with a spring-tooth was enough to prepare a suitable seedbed for grain and legumes. On April 17, the area was seeded to oats, legume, and grass. Examination after seeding showed that a large amount of residue remained on the surface and that the surface was quite rough.

"On May 5, at which time the grain was just coming up, a very hard rain fell. This storm had a total rainfall of 1.67 inches with a 30-minute intensity of 2.6 inches per hour. The total soil loss was 12 tons per acre. This intense storm fell at the most critical time of the season. Other intense storms during the latter part of May and June removed an additional 5 tons making a total soil loss for the season of 17 tons per acre.

"This watershed has an average slope of 24 percent and a maximum slope of 32 percent. Certainly it is as steep as one should try to renovate. The slope length is about 400 feet. The upper half of this watershed did not wash enough to cause even appreciable rilling. There was considerable rilling on the lower portion, however, and it was necessary to reseed a portion of this area.

"It would seem from these data that one should renovate such steep slopes in strips. A 200-foot length could be safely renovated even under the extreme rainfall conditions experienced this season."

The Effects of Different Intensities of Sheep Grazing - O. K. Barnes, Laramie, Wyoming.-"Field records for 1950 are now being worked up. A preliminary summary of the records from the rate of use study at Archer is herein reported. This study was started in 1944 for the purpose of measuring the effects of grazing at 3 intensities with sheep. Each rate of use is run on duplicate pastures and the same approximated leaf height is left on the major grass species each year. The stocking rates vary according to the year in order to obtain these same approximate degrees of utilization each year.

"Table 1 summarizes the utilization records on these pastures. This is measured by two methods. First, in terms of leaf height left, and second, by clipping randomized plots across each pasture to determine the weight of forage remaining at the end of the grazing season.

"The growing season of 1950 was dry and this is reflected in the lower rate of use and lower than average amount of carryover grass for the past year.

"Under the heaviest of the three rates of use, there has been left each year about one-half as much grass as has been left on the lightest rate of use. Under these widely different degrees of utilization, there has been a measurable change in composition of the plant cover, although so far it is a relatively small change. Under the heaviest use, the midgrasses are decreasing and the shortgrasses are increasing. Thus, the actual per cent cover of perennial grass is slightly higher on the pastures under the heaviest use.

"The grazing record is reported in Table 2 for 1950 and the average for the six preceding years. Each year, the ewe gains on the pastures under the heaviest rate of use have averaged about one-third under the gains made on the pastures under the two lighter rates of use. However, these differences in ewe gains have not been reflected in the lamb gain until this year. In 1950, the per head lamb gain was about nine pounds lower on the pastures under the heaviest rate of use as compared to the lightest rate of use.

"To date this study is still a matter of measuring the effects of these different degrees of utilization. When the vegetative changes have progressed further and/or the animal gain differences have become more pronounced, it will be possible to draw some definite conclusions as to what constitutes proper use on this range with sheep.

Table 1.--Grass left at end of season under three rates of grazing

Rate of Use Sheep Days Grazed per Acre	Grass left at end of grazing Season - lbs. per acre			Average Leaf Height at End of season	
	Blue Grama and Buffalo	All Other Perennial Grass	Total	Blue Grama and Buffalograss Inches	Western Wheat Inches
34 1944-					
25 1949	232 lbs	116	348	1.34	4.82
1950	171	118	289	1.14	3.96
57 1944-					
41 1949	135	99	234	1.05	3.60
1950	99	75	174	.92	3.80
82 1944-					
55 1949	128	61	189	.75	1.48
1950	82	22	104	.70	1.84

Table 2.--Rate of use on native shortgrass range and associated animal gains

Degree of Forage Use - Leaf Height Left at End of Season		Sheep Days Grazing Per Acre	Gains per Head		Gain per Acre	
			Ewes	Lambs	Ewes	Lambs
1.34 in.	1944-					
	1949	34	24.8	45.6	7.8	18.0
1.14	1950	25	42.8	52.7	11.2	15.9
1.05	1944-					
	1949	57	24.3	45.7	12.0	31.7
.92	1950	41	34.3	45.8	14.5	22.3
.75	1944-					
	1949	82	16.4	43.0	12.4	40.0
.70	1950	55	28.6	43.9	16.5	28.9

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio. - "Rainfall during the storm of September 1, was the largest of any single storm during 15 years of record at this project. The greatest total catch in this storm was recorded as 4.94 inches. Most of this fell in 2 hours beginning about 9 p. m. The least amount on the 1,047-acre project was recorded as 3.79 inches--about 1 mile distant from the gage of maximum catch.

"Average rainfall depth on the 300-acre prevailing-practice watershed (Government tract) amounted to about 4.50 inches. Similar value for the rainfall on conservation-practice 300-acre watersheds at the north end of Little Mill Creek was about 1.00 inch. The flood peak on the former was 2.19 inches per hour--the second highest flood in 14 years of record. That on the latter watershed was 0.21 inch per hour. The greatest flood peak on the former area occurred on June 16-17, 1946, and amounted to 2.55 inches per hour. Average rainfall depth over this 300-acre prevailing-practice watershed amounted to about 4.00 inches for the 1946 storm. This is one-half inch less than that of 1950, yet the 1946 flood peak on this size area was greater in 1946. The summary of rainfall intensities listed below reveals the cause of the difference in flood peaks.

Year	Date	Maximum amount of rainfall (inches) during a period of --							
		3 min.	5 min.	10 min.	15 min.	30 min.	60 min.	90 min.	120 min.
1946	June 16-17	0.40	0.60	0.54	1.37	2.21	3.16	3.51	3.54
1950	Sept. 1	.29	.35	.68	.99	1.65	2.95	4.27	4.64

"If the time of concentration of this 300-acre watershed was about 15 minutes, the 1946 peak would have been 47 percent of the maximum 15-minute rainfall and the 1950 peak, 55 percent.

"Runoff totals and peak rates for the meadow and pasture watersheds (less than 2 acres) were greater in the September 1950 storm than in the June 1946 storm as shown in the following table. Although the maximum 5-minute rainfall intensity for the 1946 storm (preceding table) was almost twice as great as that for 1950, the peak flows in the former year were about half as much. The fact that more

Watershed No.	Rainfall				Runoff			
	Storm		Total		Total		Peak	
	1946	1950	1946	1950	1946	1950	1946	1950
	In.	In.	In.	In.	In.	In.	In/hr.	In/hr.
130	3.05	3.82	1.76	3.26	0.69	1.02	1.45	2.47
129	3.35	3.66	1.86	3.20	.34	1.01	.71	1.93

rain preceded the time of peak in 1950 suggests the possibility that the latter was a delayed type storm and that for 1946 an advanced type. Actually, in this comparison, soil moisture at the time of the peak had a greater influence on the magnitude of the peak flow than the maximum rainfall intensity.

"Of the 1.85 inches of runoff from the 303-acre mixed cover watershed, No. 196, in the September 1950 storm, 88 percent was surface flow; 3 percent, ground-water flow; and 9 percent subsurface return flow from this storm. The contributions of surface flow from the various vegetal covers in watershed 196 is shown in the following table:

Cover	Percent of area	Surface runoff	
		Per unit of area	Percent of entire drainage basin
	Percent	Inches	Inches
Woods	26	0.5	0.13
Grass	55	1.6	.89
Corn	11	3.2	.35
Other	8	3.2	.26
Total - surface	100	-	1.63
- ground water	-	-	.05
- subsurface return flow	-	-	.17
Measured			1.85

"Soil loss for the September 1, 1950, storm was large--yet it was only about half that of the June 16-17, 1946, storm. Although the small-area cornfield runoff totaled over 50 percent more in the 1950 storm than in that of 1946 and although the flood peaks in the 1950 and 1946 storms were about the same, the loss of soil from the 1950 storm was about half that of the 1946 storm. The unprotected and loose soil in June was easier eroded than the hardened, crusted, and more protected soil in September.

"The effect of contour corn and contour strips (corn and meadow) on runoff and erosion in the September storm is shown in the following table. The runoff on the conservation watersheds was only slightly less than that on the poor practice area yet the effect on erosion was great. Differences in nitrate nitrogen losses in

Watershed: No.	Treatment	September 1, 1950			All storms July 1950		
		Runoff:	Soil loss:	Nitrate	Runoff:	Soil loss:	Nitrate
		: :per acre :	: :nitrogen: :	: :per acre: :	: :per acre :	: :nitrogen: :	: :per acre :
		Inches	Tons	Pounds	Inches	Tons	Pounds
110	Corn, straight rows	3.19	10.2	0.84	1.80	12.7	14.1
103	Corn, contour	2.62	1.5	.66	1.08	2.4	9.4
185	Corn, meadow, contour strips	2.32	.3	.40	.22	No data	No data

runoff water between the three watersheds is small--yet in direction favoring conservation measures.

"Attention is directed in the above table to the comparison of nitrate losses in the July storms and those of the September 1. Those of July were much greater--yet the total runoff and tonnage of erosion were less than those of September 1. This is reasonable as the nitrate nitrogen content of the soil is much greater in July than it is in September.

"Infiltration curves for the September 1, storm on cornland were different than any previously observed. That on contour corn watershed No. 103 started at 0.87 inch per hour and ended at 0.63 inch per hour 95 minutes later. It was a straight line. That on straight-row corn watershed No. 110 started at 0.47 inch per hour and ended at 0.40 inch per hour 105 minutes later. It was also a straight line. Apparently the exhaustion of air in pore space of the topsoil was not governing the infiltration--yet rainfall rates exceeded the infiltration rates. A possible

reason for the odd shape of the curves is that the water passes through the ground surface (sealed) very slowly. Once it passed this thin bottleneck, the water must have percolated more rapidly to greater depths. Soil samples were taken to determine the effect of the physical condition of the soil at different depths on the infiltration curves for this storm.

"In the top 14 inches of soil in the cornfields there was enough unfilled pore space before the September 1 storm to take up 5.28 inches of water. Yet from 4.30 inches of rain, over 2.5 inches of water was wasted to the streams and rivers. This was observed on the conservation watershed which had a very good alfalfa-grass sod preceding corn. It is obvious that more effort should be made to use more of the soil to achieve greater conservation of water. If all of the unfilled pores in the 7 inches of topsoil had been completely used the runoff would have been reduced about 40 percent."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska. - "The precipitation at the meteorological station totaled 5.00 inches for September, which is 2.43 inches above the long-time average for the month. This leaves us with an accumulated deficit of -0.51 inch for the year to date.

"On September 19, a general rain of about 4.0 inches fell in the area in a period of about 8 hours with maximum intensities of about 3.6 inches per hour for a 5-minute period. There was considerable runoff and erosion from the bare fields seeded to wheat in straight rows which is the prevailing tillage practice. Following the rain several farmers were observed smoothing out their fields and re-seeding their wheat. The washing that could have been avoided by conservation practices cost them topsoil, two field operations, additional seed and approximately 2 weeks of good growing weather this fall which may make considerable difference in their yields when the crop is harvested.

"We have been unfortunate in not having as much residue left on the land as we would like to have for our 4-acre stubble mulch watersheds, but we are hoping that with seeding a small amount of partridge pea, annual and biannual sweet clover in the wheat every 3 years, which was included in our work plan last spring will help to overcome this difficulty by providing additional nitrogen in the soil. The peak rates of runoff from our subtitled watersheds planted to wheat was reduced 0.6 of an inch for the storm of September 19, but we are quite sure that additional residue will further reduce the peak rates. Following are the average maximum peak rates of runoff for the storm of September 19, on our 4-acre watersheds:

Table 1.--Average maximum peak rates of runoff, storm of September 19, 1950, from approximate 4-acre watersheds, in inches per hour.

Tillage	Wheat planted in September 1950.	Old wheat stubble corn in 1951	Corn
Straight row	3.29	1.96	2.40
Contoured	1.80	1.42	1.65
Subtitled	2.67	1.30	1.80

"The average small grain yields have been computed for small grain which were harvested in July 1950 and are as follows:

Table 2.--Average yields in bushels per acre, approximate 4-acre watershed, 1950

Tillage	Oats Bu/acre	Wheat Bu/acre
Straight row	9.0	9.2
Contoured	8.4	11.4
Subtilled	8.5	9.4

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.--"September rainfall was very high, totaling approximately 7 inches. Over 4 inches fell in the 2-day period, August 31, September 1, which produced heavy water loss and high peak rates from the prevailing-treated watersheds in soy beans and only slight runoff from the bean watersheds under the conservation treatment. The picture was very similar for the watersheds in corn. The meadow and pasture watersheds produced substantially more runoff and higher peaks than conservation-treated watersheds in either corn or beans.

"A series of rains beginning on September 19 and continuing through the 21st produced two periods of important runoff on the 21st, for which the data are summarized in the following table:

Table 1.--Runoff from experimental watersheds, Purdue-Throckmorton Farm
Lafayette, Indiana, September 21, 1950

Crop	Treatment ¹	Wsd. No.	A. M. storm		P. M. storm	
			Total (Inches)	Peak rate (In./hr.)	Total (Inches)	Peak rate (In./hr.)
Corn	Prevailing	15	Trace	-	0.43	1.53
		8	0.31	0.93	1.07	3.04
		Average	0.16	0.46	0.75	2.28
	Conservation	6	Trace	-	.02	.04
		7	Trace	-	.06	.19
		Average	Trace	-	0.04	0.12
Soybeans	Prevailing	10	.06	.21	.37	1.20
		15	Trace	-	.13	.36
		Average	.03	0.10	0.25	.78
	Conservation	18	Trace	-	.04	.14
		14	-	-	.01	.07
		Average	Trace	-	0.02	0.10
Meadow	Prevailing	4	.06	.23	.59	2.11
		12	(Instruments out of order; no record)			
		Average	0.06	0.23	0.59	2.11
	Conservation	2	Trace	-	.31	1.17
		11	.01	.04	.37	.93
		Average	Trace	.02	.34	1.05

¹Prevailing System--straight row seeding and cultivation, common fertilization practices; conservation system--contour seeding and cultivation, increased fertilization, deep rooted legumes, increased organic residues returned to the soil.

"It is revealing to note that the general order of the runoff amounts and peak rates, with respect to the system of management and crop, from the highest to the lowest, was:

1. Prevailing treatment, corn
2. " " , meadow
3. Conservation treatment, "
4. Prevailing treatment, soy beans
5. Conservation treatment, soy beans or corn.

"This exemplifies the frequently stated observation that the most potent influence for control of runoff from our experimental watersheds is the contour cultivation of row crops. While erosion losses under meadow have been practically negligible, the effect of meadow cover on runoff is limited to storms of moderate intensity and short duration."

Hydrologic Studies - George A. Crabb, Jr., East Lansing, Michigan.-"Precipitation for the month of September, as measured by the U. S. Weather Bureau type of standard non-recording rain gage, amounted to 3.82 inches at the cultivated watersheds, 3.94 inches at the wooded watershed, and 4.38 inches at the stubble-mulch plots. These amounts are approximately 131 percent, 135 percent, and 150 percent, respectively, of the 50-year average September precipitation of 2.91 inches. September precipitation can be expected to equal or exceed 3.82 inches once 3.9 years.

"On September 6 the Station Supervisor in company with Messrs. Ash, of the U. S. Geological Survey, and Eichmier, of the U. S. Weather Bureau, made a complete inspection of the Rifle River Watershed Development area. Locations of stream gages already installed were checked and confirmed, and six primary rain gages were also located. The actual field inspection of this area, and discussion with technical personnel of the Michigan Department of Conservation of their technical aims and problems, further manifested the fact that this pioneer non-Federal application of the principles of stream management by head-waters control is a basically sound project, which under proper management should produce information of great hydraulic and hydrologic interest and value, as well as conservation of the soil and water.

"On September 20, at the request of Dr. G. J. Bouyoucos of the Soil Science Department, Michigan State College, a Greek agricultural mission under the sponsorship of the U. S. Department of Agriculture made a comprehensive inspection of the hydrologic installations on the Station. Dr. D. S. Catacouzinos, Director of the Central Soil Laboratory at Athens, and Dr. P. Talellis, Director of the Plant Breeding Institute at Salonika, through an interpreter, expressed a very high regard for the Station's approach to the solution of some of our basic hydrologic problems. Both of these gentlemen were high in their praise of the operations of the Soil Conservation Service and indicated that they would depend a great deal upon the advice of the Service and some of our National professional organizations for assistance in solving some of their own land use and other agricultural problems."

Hydrologic Studies - A. W. Cooper, Auburn, Alabama.-"The September rainfall of 2.21 inches represents 69 percent of the 69-year average of 3.21 inches for Auburn.

"In cooperation with S.C.S. Operations personnel, eight infiltration measurements were made with the simulated rainfall type-F infiltrometer and infiltration rings.

"Four of these tests were made on Red Bay fine sandy loam on the E. B. Stowers farm near Evergreen in Conecuh County. The averages of the infiltration measurements using the infiltrometer were 1.42 and 1.51 inches for the first and second hours, respectively. The lower value during the first hour was due to a lower rainfall intensity. The rainfall intensity for the first 50 minutes was 1.2 inches per hour, and for the next 70 minutes it was 1.7 inches per hour. Rainfall began at the end of 60 minutes. The averages of the measurements using the infiltration rings were 3.97 and 3.29 inches for the first and second hours, respectively. All four tests were made on fair fescue and Ladino clover sod.

"Also four measurements were made on the J. L. Whatley farm near Auburn in Lee County. The soil type was Madison clay loam and the cover was fair alfalfa sod. Averages of the measurements made with the infiltrometer were 0.81 and 0.33 of an inch for the first and second hours, respectively. Those made with the rings were 0.90 and 0.54 of an inch for the first and second hours, respectively.

"Probably the most profitable week of this month was spent in the mineral belt of Alabama by the engineering technical committee, consisting of F. A. Kummer, Lawrence Ennis, C. M. Sanders, and A. W. Cooper, studying erosion on steep lands. This week was devoted to studying erosion problems and making recommendations on water disposal for Alabama as well as determining those problems which need further research. The two conclusions that were reached which deviated from standard terracing recommendations and which we hope to give further study within the next year are that ridge terraces should be constructed on slopes above 7 percent and the vertical intervals between terraces should be reduced for all slopes."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-"Mr. Kirkpatrick completed the analysis of the control plot rainfall, runoff, soil loss and plant nutrient loss data. These analyses are now being incorporated into a manuscript for publication. He has now started work on a similar analysis for the pasture project.

"Mr. Holtan spent the major portion of the month in scanning rainfall and runoff data for use in developing runoff curves for the area in the vicinity of Staunton. Considerable information was gleaned from the TVA records from floods in Tennessee and North Carolina and also from certain Army engineers reports on the Roanoke and Dan Rivers in Virginia. Early in October it is planned that he will work with the Flood Control group in Staunton in attempting to arrive at runoff values that may be used effectively in their planning work."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"Precipitation at Edwardsville for the month totaled 1.55 inches. There were no periods of high intensity and no surface runoff.

"Precipitation at Fennimore for the month totaled 3.76 inches. Of this total, 1.82 inches occurred in a period of less than 4 hours on September 18. The soil at the time of this storm was quite dry and there was very little surface runoff.

"Precipitation at Colby for the month was 1.35 inches. All of this was at low intensity and no surface runoff occurred.

"Practically all of the State of Wisconsin experienced a killing frost on the night of September 23. Because of this there is perhaps about 50 percent of the corn which had not matured."

Hydraulic Studies - D. A. Parsons, Minneapolis, Minnesota.-"Although tentative plans have been completed for the construction of the 1-foot and 2-foot diameter Coshocton-type runoff samplers, the performance of the present design of the apparatus is not completely satisfactory. The results of tests of three sizes of sampler show an inherent variation in sampler catch with changing flow that is larger than desirable if the device is to be the sole means of determining the amount of runoff. The test results also suggest the need for additional study and standardization of the weight distribution of the wheel. The characteristics of the three sizes of sampler appeared to differ somewhat at high discharges.

"Another reason for reconsideration of the design comes from the results of recent tests with sand. The catch of sand is too large with the present design, increasing with increasing discharge to a maximum of about 35 to 30 percent greater than intended. It is expected that this deviation with sand is greater than would be obtained with most soils that would be transported in suspension through the approach flume. A change in the slot design may help in obtaining a more nearly constant sample of sand or soil, and sample water volumes equally as good as the present design."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"Testing was started during September. The following tests were run:

Channel or structure	Lining	Expt. No.	No. of tests	Range of discharge
Chute L2AF	-	2	5	22-170 cfs
Channel L2A	Bermuda	2	5	22-170 cfs
Channel FC25	Bermuda and Concrete	1	4	0.9-5 cfs

"The tests on chute L2AF were a repeat of those run a year ago. There were three reasons for repeating the tests. These were: (1) To test behavior of the chute at a higher discharge rate than was obtainable last year, (2) to test effect of an improved approach channel on flow profile in chute, and (3) to check the effectiveness of the SAF stilling basin with changed conditions downstream.

"A detailed analysis of the chute experiment has not been made yet. However, a few things were apparent. The peak discharge reached was 170 c.f.s. This is 5 c.f.s. less than the design discharge, but still near enough to provide a check on the design calculations. The more symmetrical approach channel did not have much effect on the flow profile in the chute. The curve in the approach channel still caused an irregular entrance condition. The resulting waves did not materially affect the capacity of the chute nor the performance of the stilling basin. There was some slight additional scour below the stilling basin. However, it appeared to be negligible.

"The Bermuda grass cover in channel L2A was much improved over last year when there was just a thin, weedy stand. This year's good cover offered good protection to the channel. Last year there was excessive erosion at the point of reverse curvature. This year there was but little.

"The tests on FC25 are the low flow tests only. The experiment will be completed in October and the results discussed then.

"The mulching placed in channel FC26 following seeding was subjected to some good tests during September. As reported in August this newly graded channel was seeded to Sudan grass and covered with hay at a rate of 2 tons per acre. This seeded portion of the channel is 242 feet long and 36 feet wide at top. The bottom width is 20 feet and the slope is 6 percent. Three rain storms occurred following the planting which exceeded 3 inches per hour. No damage was done to the channel. It is believed that under the same conditions but without the mulch rilling of the channel bed would have occurred. This observation is based on visual comparisons with other channels planted in previous years."

Supplemental Irrigation - John R. Carreker, Athens, Georgia.-"Rainfall was recorded in September as follows: Sept. 1 - 0.11"; 2 - 0.24"; 7 - 1.48"; 8 - 0.70"; and 22 - 0.29"; totaling 2.87 inches, or 0.38 inch less than the long-time average of 3.25 inches. The soil-moisture supply was excellent the first part of the month but was becoming deficient near the end.

"The tomato harvest on the irrigated and unirrigated plots in Block I was completed September 5. Yields by plots are given in table 1, together with a record of the number of plants and the plants severely infested with nematodes in each plot. Even though we treated the plots with Dowfume N, the nematode infestation in plots 2 and 3 apparently offset any beneficial effects from the irrigation water. It should be noted that the lack of infestation in irrigated plot 5 and the variation in the number of plants damaged in the unirrigated plots 1, 4, and 6 indicates the nematodes were not necessarily introduced or influenced by the irrigation water.

"Corn yield records from irrigated and unirrigated plots on lowland and upland are given in tables 2 and 3, respectively. The lowland corn was at the irrigation plots and received irrigations of 1.50 and 1.34 inches on July 1 and 11, respectively. The unirrigated plots yielded 109.1 bushels per acre and the irrigated plots 120.6 bushels per acre, for an increase of 11.5 bushels per acre, or 10.5 percent.

"The upland corn was in Terrace T-1D #1 at the Southern Piedmont Conservation Experiment Station. The yields were increased from 57.7 bushels per acre to 74.4 bushels per acre, or 16.7 bushels per acre with 1 application of 1.50 inches on July 3. Another irrigation was needed later, but the equipment was in use on the irrigation plots and could not be moved to Watkinsville.

"Liquid nitrate fertilizer was applied to the corn in Block I of the irrigation plots on June 15 at 3 rates, as described in the June monthly report. All plots were irrigated 1.50 inches and 1.0 inch on July 1 and 10, respectively. Yields records from this corn showed the following results:

lb/ac N applied	75.5	141.0	211.5
corn yield bu/ac	128.1	129.4	135.7

"Even though the corn was not damaged by sprinkling on these rates of nitrate fertilizer the yield responses were not sufficient to justify the increased rates of application."

Table 1.--Yield of tomatoes, number of plants, and record of nematode infestation by plots in Block I, 1950

Plot No.	Treatment	Yield lb/ac.	No. Plants	No. plants infested with nematodes
2	Irrigated	20,621	103	61
3	"	26,982	115	58
5	"	29,899	95	3
Average	"	25,834	104	-
<hr/>				
1	check	26,976	105	17
4	"	25,808	108	27
6	"	25,616	100	7
Average	"	26,133	104	-

Table 2.--Yield of irrigated and unirrigated corn, by plots in 1950 on lowland Block II

Unirrigated		Irrigated	
Plot No.	bu/ac	Plot No.	bu/ac
2	96.3	1	117.3
4	112.6	3	110.8
6	118.5	5	133.6
Average	109.1	Average	120.6
		Increase	11.5
		equals	10.5 percent

Table 3.--Yield of irrigated and unirrigated corn in 1950 on upland at the Southern Piedmont Conservation Experiment Station

Unirrigated		Irrigated	
Plot No.	bu/ac	Plot No.	bu/ac
1	58.8	2	73.6
5	omit*	3	76.2
6	67.0	4	70.7
8	47.4	7	77.1
Average	57.7	Average	74.4
		Increase	16.7
		equals	28.9 percent

*Irrigation water blew onto this plot from wind action.

Drainage Studies - J. C. Stephens, West Palm Beach, Florida. - "Rainfall over the area for the months of August and September was below normal. The rainfall pattern over the Flood Control District from January 1 to September 30 was summarized briefly as follows: for the western Kissimmee Valley, 50 to 60 percent of normal; for the area tributary to western Lake Okeechobee and eastern Kissimmee Valley, 60 to 70 percent of normal; for eastern Lake Okeechobee, the agricultural lands in the upper 'Glades and the proposed 'Glades conservation areas, 70 to 80 percent of normal; and for the east coastal area, 80 to 90 percent of normal. Flow from the Kissimmee River into Lake Okeechobee was the lowest recorded on September 30 for the period of record. Unless unusually heavy rains occur before November 15, it is probable that the area will experience a water shortage before next summer's rainy season begins. For August, at the Everglades Experiment Station, rainfall was 10.00 inches, evaporation from the standard pan was 5.809 inches, mean maximum temperature was 91.0 degrees, and the mean minimum temperature was 69.5 degrees. For September, rainfall was 2.70 inches, evaporation was 5.980 inches, mean maximum temperature was 90.8 degrees, and mean minimum temperature was 69.5 degrees.

"During August routine flow measurements were continued on the Tamiami Canal slope courses. A meeting was held in Orlando with the State Coordinator, the State Soil Survey Supervisor, and the Assistant Engineer of the Flood Control District in regard to the feasibility of making a Land Capability survey of the Kissimmee Valley and upper St. Johns River Valley in cooperation with the Central and Southern Florida Flood Control District. Trips were made to Tallahassee and to Jacksonville to discuss other work with State and Federal officials. During the absence of the Project Supervisor in August the Engineering Aid assisted employees of the Flood Control District in printing and assembling several hundred thousand pages of material to be used in court proceedings to procure lands for the conservation area in Broward County.

"A large part of the month of September was spent assisting in the preparation of a 'Report on the Hydrologic Properties of the Aquifer in the Miami Area.' This report was prepared in cooperation with the Engineering Department of the Flood Control District and was reviewed by Nevin Hoy, H. H. Cooper and John G. Ferris of the U. S. Geological Survey who made several valuable contributions to it. Briefly summarized the report shows the important influence of the permeable strata in regard to design and location of water retention and flood-control levees in the lower Everglades. It states that the aquifer in this area is one of the most permeable ever investigated by the U. S. Geological Survey, averaging approximately 50,000 G. P. D. (Meinzer units) with an average coefficient of transmissibility of approximately 3,000,000 along the proposed east levee of conservation unit #3. It was shown that while the transmissibility does vary from location to location, it is largely a function of depth from a macroscopic standpoint and the pinching out of the formation to the northwest is an important factor to be considered in design of the conservation areas. It was shown that the effectiveness of the natural blanket of peat soils, Lake Flirt marl, and Pleistocene sedimentary deposits which generally fill the solution holes and interstices of the upper stratum of the aquifer was important, but does not greatly reduce the magnitude of the seepage problem in this area. It was also shown that the value of such a natural blanket was equal to a prism of the aquifer of approximately 500 feet long when seepage under a levee was intercepted on the lower side by a relief borrow canal of sufficient size and depth to remove the water as fast as it seeped under. By assuming a levee to be built from hauled-in fill, with no borrow canal, the value of the blanket was found to be approximately doubled. Under these conditions, and with a water-level difference of 2.0 feet, the seepage under the levee would amount to approximately 80 c.f.s. per linear mile in this first case, and approximately 40 c.f.s. in the second case, using a coefficient of transmissibility of 3,000,000. The probability of turbulent flow existing at higher pool stages and that such flow

would not strictly follow Darcy's Law, was pointed out, and that levee and pool stage design that would create turbulence for prolonged periods would probably enlarge solution holes to an extent that would increase the underground flow to values that would threaten the successful operation of the lower conservation area."

Drainage Studies - M. H. Gallatin, Homestead, Florida. - "Rainfall for this period was about normal. Rains were recorded on 28 days with rains of over 1 inch recorded on 12 days. Rains of over 2 inches occurred on 2 days. The average rainfall for all our stations was 6.96 inches. This is a little less than the average of the past 4 years when the rainfall varied from 7.50 to 20.55 inches. In general, rainfall was distributed over the area fairly uniformly with the exception of a small narrow strip in the vicinity of gages 6 and 7 and extending eastward to Peters, Fla.

"In general there has been a slight increase in the water table for the area during this period. Readings of the wells on the Redland profile show that we had the greatest gain in about the middle portion with only slight gains at the south end and a loss of 0.2 foot at the north end. The maximum gain recorded was 0.67 foot at Well #8. Normally we would not have had a loss as indicated by the readings at the northern end of the profile but this past period the rains have been following the coastal ridge and rainfall has been light in the Everglades area. Therefore, as shown by the readings from the Everglades profile the ground water along the western and northern edge has been moving west and north into the Everglades area.

"Water-table readings for the Eureka profile show that the gain in water table varied from 0.03 foot at Well #14 to 0.85 foot at Well #22 toward the eastern end of the profile.

"Readings for the Mowry street profile show gains of 0.06 foot at the western end to 0.29 foot at the eastern end.

Everglades Profile

Well Location	8/30/50	10/3/50	Gain or loss
Trail and Krome	6.08	6.12	plus 0.04
Bird Road	6.06	6.15	" .09
Staff gage	6.39	6.22	minus .17
G-25	6.50	6.27	" .23
G-24	6.43	6.23	" .20
G-23	5.85	6.02	plus .17

"Readings indicate that there was a slight gain in the ground water at the northern end of the area near the Trail with losses of 0.17 to 0.23 foot for the area between the Staff Gage and the pine woods.

"Readings at Well #5 at the corner of Mowry and Redland Road for the past 5 years show that our water table on September 30 was somewhat lower than in previous years

9/30/50	3.31
49	5.27
48	6.46
47	5.32
46	4.46

"With light showers occurring throughout the period moisture readings on the mulch plots remained low during all of this period. It was noted that with the constant light rains the shavings mulched block became saturated about as quickly as the grass and pine straw mulched areas.

"Chloride samples were collected in the Miami area on September 13. In comparison with samples collected over the same area on July 10 the concentration of chlorides remained about the same.

"Chloride samples collected in the Homestead area on September 14 and analyzed for chlorides showed that on the whole there had been a slight decrease in concentration. At the time of sampling no heavy rains had occurred in this area and had we gone on throughout the remainder of the fall to planting time much of the coastal area would have been too heavily contaminated to raise good crops. Since October 1, several heavy rains have occurred which should leach out some of the chlorides. These areas will be resampled toward the end of the next period to determine what effect the heavy rains have had on the concentration of chlorides."

Drainage Studies - I. L. Saveson, Baton Rouge, Louisiana. - "Weather conditions have been ideal for grading work as the rainfall for the past month has only been approximately 1 inch at the particular work site. Smoothing and grading work has been completed on the 40-acre test area at St. Delphine Plantation and approximately one-half of it has been planted. Planting on the rest of the field is being delayed due to the lack of moisture. In this test area, two cuts are to be planted flat in order to determine the feasibility of flat planting, and also its effect on drainage. A second test area on St. Delphine Plantation was used for the Field Day on September 19. This test area consists of approximately 50 acres, and it is 90 percent complete.

"The field day was held in conjunction with the Louisiana Sugar Planters Field Day. Approximately 250 people were present, with the greater portion being from the sugar cane area; however, a number of Soil Conservation District Supervisors and Soil Conservation Service personnel from the cotton area of the delta section of Louisiana were also present. Local representatives for the following manufacturing companies were also present: The Southern Equipment & Tractor Company for Allis-Chalmers and Gar Wood Industries; Boyce-Harvey Machinery Company for the Caterpillar Company; the local International Harvester Company; the Eversman Manufacturing Company representative from Denver, Colo., and Mr. E. G. Leviens, agent for the Marvin Manufacturing Company. In addition to the local representatives, the Chief Engineer for the Findlay Division of Gar Wood Industries, Mr. George E. Miller, and the agricultural representative of the Caterpillar Company, Mr. J. I. Davis, were present. Representatives from the Louisiana Agricultural Experiment Station were also in attendance.

"At the Field Day, methods for using the following types of equipment for grading land for drainage were demonstrated. Bulldozer, motor graders, scrapers, land levelers in conjunction with track type tractors, scrapers and land levelers in conjunction with wheel type tractors. Ditches were cut with the experimental wheel-type trencher."

Drainage Studies - Ellis. G. Diseker, Raleigh, North Carolina.-"Experiments in the control of aquatic plants in the McRae drainage canal were continued. The data reported in the table below are the results of the spray applications of Estrones #245 and #44, with different concentrations and mixtures of each, which were applied August 29. Observations of these results were made on September 27, 1950.

"Estrone 44, with either a concentration of 3 ounces per 4-gallons of water, (1 gallon Estrone per 200 gallons of water, approximately.), or a concentration of 6 ounces per 4 gallons of water, (1 gallon Estrone per 100 gallons of water), gave better results than any of the other sprays reported in former reports for the control of paese strife (*Ludwigia Palustris*), penny wort (*Hydrocotyle Umbellata*), and burr reed (*Sparganium*). Estrone 44 did not affect the Rush (*uncus Effusus*) other than to burn the tops of the plant, the same as had occurred with the use of Estrone 245.

"A mixture consisting of 3 ounces of Estrone 44 and 3 ounces of Estrone 245 per 4 gallons of water, was applied to a common broad leaf water plant. This plant has a leaf about 3 to 6 inches in diameter, a yellow bloom, and a root stock about 2 inches in diameter and 12 to 24 inches long. Samples of this plant have not been brought in to the Botany Department for identification. From the time of application of the mixture, until observations were made, all of the leaves of the plant in question were killed; but during this period new leaves were produced and had grown to be about 3 inches in diameter at the time of observation.

"Since the 3 ounces of Estrone 44 per 4 gallons of water showed such good results when applied to the Loose Strife and Penny Wort, and also to the Burr Reed--which causes the most damage, a sufficient quantity of the material has been secured and the entire length of the canal is now being sprayed.

"The chemical spray was applied on August 29, which was several days prior to rainfall. The maximum velocity of water in the canal at the time of spraying was about 6 feet per minute. The table mentioned above will appear on the next page."

Drainage Studies - Charles B. Gay, Fleming, Georgia.-"The hurricane rains the first part of the month amounted to 16 inches. This stopped all field activities. However, it gave us an opportunity to catch up on some of our maintenance work and to do a number of odd jobs which needed attention. This heavy rainfall flooded approximately 20 acres of our low land to a depth 2 to 3 feet, and the land stayed under water for about one week. We do not have adequate outlets under the highway and the water was impounded to some extent in the low areas. We are attempting to work out an arrangement with the highway officials now whereby they will provide us with an adequate outlet under the highway.

"Our first ditching was started this month. We have dug several hundred feet of ditch with the dragline through the low area along the Fleming Road and have blasted 400 feet of a 1,400-foot ditch. This ditch blasting was conducted by a dynamite specialist of the Dupont Powder Company. Mr. Lee Davenport of Dupont made the test shot on September 27, and Mr. John Lee of Dupont blew the ditch on September 30. This blasting served two purposes; one of which was to blast a ditch that is needed to drain a low area in order that heavy machinery can be used to finish clearing, and second, as a demonstration. The demonstration was publicized by district personnel in Coastal Georgia as well as the local papers and radio. Approximately 75 farmers attended. We had a good demonstration and a great deal of interest was displayed. Cost figures as well as efficiency and maintenance cost

Table 1, Continued (Plymouth, N. C.)

Chemical mixtures	Date of: appli- tion :	Date and amount of rainfall :	Date of: inspec- tion :	Name of plants	Percent: of : tops :	Percent: of : roots :	Plant description
Estrone 44 (3 oz.)	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Penny wort	No evil-	No evil-	Leaves 1-1/2" diameter,
Estrone 245 (3 oz.)	9/22 - .70" (In 10 hrs)			(Hydrocotle Um- bellate)	dence of plants	dence of plants	dence green in color, semi- prostrate.
Estrone 44 (3 oz.)	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Burr Reed	100	100	Leaves 5/8 x 18", re- sembles a lily.
Estrone 245 (3 oz.)	9/22 - .70" (In 10 hrs)			(Sparganium)			
Estrone 44 (3 oz.)	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Rush	Only	0	Round blades, 1/8 x 18",
Estrone 245 (3 oz.)	9/22 - .70" (In 10 hrs)			(Uncus Effusus)	burned the tops		Dark Green pointed tops
NOTE: The Smart Weeds present were not seriously damaged.							
Estrone 245	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Paese Loose Strife	No evil-	No evil-	Leaves 1" diameter,
(#-oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Ludwigilia palus- trius)	dence of plants	dence of plants	green and purple pros- trate.
Estrone 245	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Penny wort	present	present	present.
(3 oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Hydrocotle Um- bellate)	" "	" "	Leaves 1-1/2" diameter, green in color; semi- prostrate.
Estrone 245	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Burr Reed	85	85	Leaves 5/8 x 18", re- sembles a lily.
(3 oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Sparganium)			
Estrone 245	8/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Rush	Only	0	Round blades 1/8 x 18",
(3 oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Uncus Effusus)	burned the tops.		Dark Green pointed tops.
NOTE - Smart weeds present were not seriously damaged.							
Estrone 44	9/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Paese Loose Strife	No evil-	No evil-	Leaves 1" diameter,
(3 oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Ludwigilia palus- trius)	dence of plants	dence of plants	green and purple pros- trate.
Estrone 44	9/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Penny wort	present	present	present.
(3 oz. per 4 gal. water)	9/22 - .70" (In 10 hrs)			(Hydrocotle Um- bellate)	" "	" "	Leaves 1-1/2" diameter green in color; semi- prostrate.

Table 1, Continued (Plymouth, N. C.)

Chemical mixtures	Date of: : appli- : tion :	Date and amount of rainfall :	Date of: : inspec- : tion :	Name of plants	Percent: : of : : tops : : killed :	Percent: : of : : roots : : killed :	Plant description
Estrone 44 (3 oz. per 4 gal. water	9/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Burr Reed (Sparganium)	100	100	Leaves 5/8 x 18", re- sembles a lily.
Estrone 44 (3 oz. per 4 gal. water	9/29/50	9/13 -7.70" (In 24 hrs)	9/27/50	Rush (Uncus Effusus)	Only singd tops.	0	Round blades, 1/8 x 18" dark green, pointed tops

NOTE: No smart weeds were present. A few semi-round broad plants were present, with yellow flowers. The leaves were 3 to 6 inches diameter with root stock resembling banana stalks. Leaves on these plants were killed, but new ones grew to 3" diameter in 30 days from date of applying spray.

will be kept on the blasted ditch. Comparison with a similar ditch in the same area dug by dragline will be made."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"The Project Supervisor has continued with the summarization and outlining material for the proposed quick-sand drainage bulletin. He also completed a paper reporting the preliminary tests that were made on different permeability sampling cylinders. This paper has been approved for presentation to the Soil Science Meeting at Cincinnati.

"Mr. W. L. Turner, Soil Scientist, reports that in assisting the Project Supervisor in the preparation of the above paper, he carried out some additional analytical comparisons. Results of these comparisons do not change in any way the conclusions presented in that paper. They are given herewith as additional support:

Table 1.--Analysis of variance for rate of percolation for 3-inch cores both driven and jacked and the corresponding 3.82-inch cores jacked

Source of variance	Degrees of freedom	Sum of squares	Mean square
Treatment	2	19.9806	9.9903
Horizon	17	8819.2143	518.7773
Interaction	34	735.0377	21.6188
Cores treated alike	183	4593.8673	25.1031
Total	236	14168.0999	

Table 2.--Analysis of variance for rate of percolation for 3-inch cores driven and the 3.82-inch cores jacked

Source of variance	Degrees of freedom	Sum of squares	Mean square
Treatment	1	5.3198	5.3198
Horizon	21	7749.8445	369.0402
Interaction	21	483.0196	23.0009
Cores treated alike	148	5351.6752	36.1600
Total	191	13589.8591	

"He also reports in assisting Mr. Forrest Steele, Survey Supervisor, and Mr. R. E. Devereux, State Soil Scientist, in preparing a paper on 'Permeability in Land Classification' to be presented on the same program, he completed a study of the effects of structural shapes, direction of natural fracture, and texture upon permeability. The results of this study are outlined below:

"In order to associate soil permeability with some of the characteristics of the soils sampled in Virginia for laboratory permeability determinations in the past 2 years, the rates of percolation have been tabulated on a listing sheet of a three criteria of classification showing structural shape, direction of natural fracture, and texture as given in the mimeographed descriptions on hand. The analysis of variance follows in table 3, which appears on the next page.

Table 3.--Analysis of variance for the rates of percolation classified according to structure, fracture, and texture for Sites No. Va-103 through 223 omitting Sites No. Va-127, 128, 130, 140 (C horizon only), 183-5, 207, 211-13, 218, and 219

Source of variation	Degrees of freedom	Sum of squares	Mean squares
Main effects			
Structure (S)	7	4322.3829	617.4833
Texture (T)	5	2011.2090	402.2418
Fracture (F)	3	2170.5254	723.5084
First order interactions:			
S x T	35	1514.4249	43.2693
S x F	21	1225.6579	58.3647
T x F	15	585.7820	39.0521
Second order interactions:			
S x T x F	105	437.7778	4.1693
Individuals	92	4475.7874	48.6499
Total	283	13120.6675	

"Structural shape, direction of natural fracture and texture are indicative of soil permeability. Table 4 gives the number of observations, average rate of percolation, and permeability symbol for the data behind table 3 according to structure, direction of natural fracture and texture.

Table 4.--Number of observations, average rate of percolation, and permeability symbol for the data behind table 3 according to structure, direction of natural fracture, and texture

STRUCTURE								
	1/ 86	2/ 83	3 5	Nuciform 26	Granular 38	Platy 5	Single grain 35	Massive 5
Number of observations	86	83	5	26	38	5	35	5
Average rate of percolation in/hr.	2.85	5.87	11.76	12.73	13.11	7.07	8.75	0.10
Permeability symbol	5	6	7	7	7	6	6	2
DIRECTION OF NATURAL FRACTURE								
	Vertical		Oblique	Horizontal		Indeterminate		Total
Number of observations	8		22	88		166		284
Average rate of percolation in/hr.	10.05		5.02	3.14		9.06		6.94
Permeability symbol	7		6	5		6		6
TEXTURE								
	Heavy		Medium heavy	Medium	Moderate light		Light	Very light
Number of observations	83		90	40	64		5	2
Average rate of percolation - in/hr.	3.31		7.10	9.21	10.17		4.20	8.54
Permeability symbol	5		6	6	7		5	6
1/ Horizontal axis longer than vertical. 2/ Horizontal axis equal to vertical.								
3/ Vertical axis longer than horizontal.								

"Table 4 clearly illustrates the unreliability of depending upon an average for one soil characteristic in estimating the degree of permeability of a soil horizon. Except for massive structure all of the average rates range from moderately rapid to very rapid. But individually the rates range from very slow to very rapid. Moreover, individually 37.67 percent of the total number of soil horizons range from very slow to moderate. Table 5 gives the number and the percentage of horizons for each degree of permeability.

Table 5.--The number and percentage of 284 soil horizons per each degree of permeability

Symbol	Degree of permeability						
	Very slow	Slow	Moderately slow	Moderate	Moderately rapid	Rapid	Very rapid
	1	2	3	4	5	6	7
Number of horizons	3	25	39	40	55	62	60
Percentage	1.06	8.80	13.73	14.08	19.37	21.83	21.13

"Besides these three soil characteristics others are also indicative of the degree of permeability. In particular the size and number of pores are important. An estimate of soil permeability must be based on the cumulated effects of all recognizable characteristics indicative of degree of permeability.

"With the three tables in mind we might attribute tendencies towards degrees of permeability for each of the three characteristics involved. In regard to structure, fragmental with the vertical axis longer than the horizontal, nuciform, and granular indicate the higher degrees; fragmental with the horizontal axis equal to the vertical, platy, and single grain indicate the intermediate degrees; while fragmental with the horizontal axis longer than the vertical, and massive the lower degrees of permeability. In regard to the direction of natural fracture, vertical indicates the higher, oblique and indeterminate the intermediate, and horizontal the lower degrees of permeability. These interpretations are tabulated in table 6.

Table 6.--Degrees of permeabilities indicated by structural shapes, direction of natural fracture, and texture

Soil characteristics	Degrees of permeability		
	High	Intermediate	Low
Structure	Fragmental - vertical axis longer than the horizontal Nuciform - Granular	Fragmental - vertical axis equal to the horizontal Platy - single grain	Fragmental - horizontal axis longer than the vertical. Massive
Fracture	Vertical	Oblique Indeterminate	Horizontal
Texture	Moderate light	Medium heavy Medium Very light	Heavy

"Some explanation and discussion on indeterminate fracture is in order. This designation includes no difference in direction of natural fracture. But chiefly it includes no mention of direction of natural fracture in the permeability description.

This inclusive and indefinite characteristic, especially in view of the large number of items vitiates, or at least masks the indications of soil permeability as indicated by direction of natural fracture."

Sedimentation Studies - Louis M. Glymph, Jr., Lincoln, Nebraska.-"Observations were continued during the month to record condition of the corn on flood plain plots established in southeastern Nebraska following the flood of May 8 and 9. The plots on the Salt Creek flood plain were flooded to a depth of about 2 feet on July 31. This flood left a layer of sediment varying from about one-quarter to about 1 inch thick on the plots and bent over a few of the corn stalks. But the total effect of this flood appeared to be rather negligible. By the middle of August the corn was from 8 to 9 feet tall on both the scoured and silted plots on the Salt Creek flood plain. Variations in height of corn on the different soil conditions continued to be much more pronounced on the Hooper Creek flood plain. In this valley, corn on the scour area ranged in height from 4 to 8 feet; on the no-change area from 8 to 10 feet; and on the silted area from 9 to 10 feet.

"Observations of the corn on flood plain plots were continued in September but no additional differences of significance were noted. Ears were set and the crop was reaching maturity. The parts of rows to be harvested for yield were relocated in the field from notes taken before the corn was planted.

"At the request of Mr. McClymonds the project supervisor spent 1 day with Soil Conservation Service personnel in Nemaha County, Kans., studying silting of the Sabetha, Kans., municipal water-supply reservoir. The Service has received a request from the City of Sabetha for assistance in planning and establishing treatments in the 9-square mile watershed in aid of sediment control. An investigational program involving determination of the rate of silting, sediment sources, recommended watershed treatments, and continuing observations to record the effects of treatments in reducing the rate of sediment production is being developed for this area.

"Most of the month was spent preparing the first draft of a paper tentatively titled "Relation of Sedimentation to Accelerated Erosion in the Missouri River Basin." Copies of the draft were submitted to a number of different people in the Service for their consideration. It is contemplated that the Department of Agriculture will prepare a statement on this general subject for submission to the Missouri River Basin Inter-Agency Committee, probably at its meeting next January."

Sedimentation Studies - Russell Woodburn, State College, Mississippi.-"Emphasis has been placed during this month upon completing the final report of the Sedimentation Conference held at State College, Mississippi, on August 28-31, 1950. At this conference we had representation from a number of agencies over the United States who are concerned with calculation of channel transport capacity using the Einstein system."

12/13/50

IRRIGATION AND WATER CONSERVATION DIVISION

Permeability and Stability of Soil and Soil Materials - C. W. Lauritzen, Logan, Iowa.-"The investigation of seepage losses and ground water conditions on the Eden project in Wyoming was continued. The in flow, out flow measurements, while inconclusive, did not indicate that the canal was subject to heavy losses in the sections measured. Measurements with a seepage meter at two locations, likewise indicated that losses were small. At the other location, losses, as determined by the seepage meter, were very high. Sites for some ponding measurements were selected and arrangements were made for Bureau of Reclamation personnel to install bulkheads and water stage recorders in preparation for seepage loss measurements by this method. The ponding measurements will be undertaken in the near future. In addition to the seepage loss studies, some pilot drains are being installed."

Lining of Irrigation Canals and Ditches - C. W. Lauritzen, Logan, Iowa.-"Routine observation of the experimental linings at the River laboratory and preparation for the installation of asphaltic linings in Channel A were continued."

Irrigation Studies - Stephen J. Mech, Prosser, Washington.-"The affect of different soil moisture treatment has shown some marked differences in corn height. These differences have aroused our interest in the resulting forage and grain yields. The following is a brief summary of our results to date including silage yields taken on September 26 - 27.

	<u>Wet</u>	<u>Plot Designation</u>	
		<u>Medium</u>	<u>Dry</u>
Number of irrigations after planting	8	3	2
Average height of corn stalks in feet	9.9	9.2	8.1
Field weight of silage in tons/acre	14.5	14.0	11.8
Avail. moisture in 4-foot root zone on September 26	88%	67%	60%
Yield on dry weight basis to be reported later	?	?	?

"An indication of the variation in the moisture content of growing corn as it may be influenced by irrigation is shown in the following table. On July 27 when the corn was just beginning to tassel, 3 stalks each from the wet, medium, and dry plots were cut and permitted to air dry. The wide variation in dry matter percentage is very interesting and seems to tie in with our indicated reduced consumptive use at the lower soil moisture level.

	Plot Designation		
	Wet	Medium	Dry
Days since last irrigation	10	6	90
Available soil moisture in 4-foot depth on July 27	61%	85%	17%
Percent of dry matter in stalk	17.0	16.0	25.5
Moisture percentage in stalk	82.9	84.0	74.5

Irrigation Studies - P. Earl Ross, Weslaco, Texas. - "Consumptive-use factors for the Lower Rio Grande Valley of Texas were calculated by the method developed by Blaney and Briddle. The results are shown in the following table:

Consumptive-use of water factors for the Lower Rio Grande Valley of Texas

Growing season 336 days (January 23 to December 25)

Latitude 26°30'

(Weather data taken from Brownsville, Texas)

	Temperature			
	Deg. F.	Percent	Consumptive use factor	Rainfall
January	59.8	7.30	4.36	1.40
February	62.6	6.94	4.34	1.19
March	68.2	8.35	5.69	1.22
April	73.7	8.70	6.41	1.39
May	78.6	9.51	7.47	2.65
June	82.4	9.48	7.81	2.72
July	83.6	9.69	8.10	1.90
August	83.9	9.25	7.76	2.53
September	80.6	8.36	6.74	5.58
October	74.9	8.02	6.01	3.19
November	67.2	7.23	4.85	1.95
December	61.2	7.17	4.39	1.76
		100.00	73.93	27.48

"This annual consumptive use of water factor of 73.93 is interesting in that it shows the large amount of water required for around the year farming in the Lower Rio Grande Valley. Although the rainfall of 27.48 inches reduces somewhat the irrigation water requirement, it is at the same time a liability in that much of it comes in rain storms of several inches immediately following heavy irrigations. The total amount of water required makes obvious the need for good irrigation practices if the structure and productivity of our soils are to be maintained."

Irrigation Studies - Walter R. Meyer, Garden City, Kansas.-"The 5th of September, Dr. Myers called a meeting of the steering committee to plan for the research work that was to be started at Lindsbergh, Kansas. Forty-five acres are to be put under irrigation and will be divided up into six fields. The primary crops are to be alfalfa and brome pasture, corn, and some alfalfa hay. The operator is to carry on a livestock program primarily. Suggestions were made as to type of records to be kept which included the amount of water applied to each crop. An Engineer is to be hired by the Extension Service to help with the project and other demonstration farms to be established in that section of Kansas. Fertility plots are to be studied with corn on the farm and will be started by Dr. Smith."

Irrigation Studies - Byron Tomlinson, Laramie, Wyoming.-"The data appearing in the table on the next page indicate that the production on the native meadow can be doubled by the use of commercial fertilizers and water control. The use of nitrogen on these native sods seemed to be the fertility factor which increased the yields. You will note by analyzing the above table that F₇ application of ~~lime~~, 200# P₂O₅, and 80# of nitrogen per acre doubled the yield. In analyzing F₉ which was 80# nitrogen per acre also doubled the yield. This seems reasonable because of the lack of legumes in these native sod plots. No attempt was made to vary the irrigation rates on this area this season because it was impossible to vary the rates on the new seedings without causing damage to the plants."

Imperial Valley Drainage Investigations - George B. Bradshaw, Imperial, California.-"A study of soil lenticles has been initiated to determine their extent and probable origin. Lenticles are vertical sand dikes varying in width from 1-1/2-feet down to less than an inch in width. It is of considerable value in drainage work to be able to detect in what fields there will be lenticles and in which ones not. These sand lenticles facilitate the movement of excess ground water down and out the drainage systems. It has been found that these lenticles occur along fault lines in the Imperial Valley, of which 14 have been plotted to date. The lenticle or sand dikes were probably formed in the following manner. Earthquake waves cause alternate compression and tension in the rock or mantle through which they pass. The resulting disturbances cause changes in underground drainage and ground-water movement.

"During the recent Imperial Valley earthquake, lenticles were formed in this manner. In some fields large quantities of water were forced to the surface and mud boils were formed. There are also a number of stress lines being filled in by wind action at the present time."

Irrigation Infiltration Studies - V. S. Aronovici, Pomona, Calif.-"The field work on three irrigation runs, as detailed in the Monthly Report of August 1950, were completed this month. Briefly, the study includes the following: measurement of the water applied to an irrigation furrow and drainage from the irrigation furrow; soil moisture sampling before and after irrigations; securing of representative Uhlund and Pomona soil samples of a furrow; and duplicate ring infiltrometer measurements of a comparable furrow to that studied. From these data, the intake rate of the furrow is compared with the intake rate of the ring infiltrometers and the laboratory processing of the Uhlund and Pomona samples.

Pinedale Native Hay Yields, 1950

Treatments	Dry Matter in Tons per Acre												Sum	Means	Hay Yield of Mean in Tons/a at 12% Moisture
	Plot 1	Plot 10	Plot 11	Plot 21	Plot 30	Plot 31	Plot 41	Plot 50	Plot 51	Plot 60	Plot 61	Plot 69			
F ₁ Check	.25	.57	.38	.30	.83	.12	.34	.40	.20	.73	.56	.20	4.88	.41	.47
F ₂ 4000 lbs/acre Lime to pH 6.5	.41	.51	.30	.25	.43	.31	.29	.49	.19	.52	.53	.53	4.76	.40	.50
F ₃ 100 lbs. P ₂ O ₅ /A Lime and	.37	.36	.80	.29	.40	.26	.16	.41	.39	.35	.34	.26	4.39	.37	.42
F ₄ 200 lbs P ₂ O ₅ /A Lime and	.79	.43	.58	.57	.60	.32	.59	.40	.16	.72	.42	.26	5.84	.49	.56
F ₅ 200 lbs.P ₂ O ₅ /A	.39	.27	.82	.26	.59	.23	.71	.60	.69	.87	.34	.12	5.89	.49	.56
F ₆ Lime & 200 lbs. P ₂ O ₅ /A & 40 lbs. Nit/A (2 Applic.	1.14	.53	.99	.69	1.00	.77	1.01	.57	.39	.68	.41	.18	8.36	.70	.80
*F ₇ Lime & 200 lbs. P ₂ O ₅ /A & 80 lbs.Nit/A	1.85	1.26	.75	.85	1.07	.52	.76	.73	.49	.37	.77	.20	9.62	.80	.91
F ₈ 40 lbs.Nit/A (2 applic.)	.90	.98	.76	.59	.19	.38	.53	.93	1.02	.37	.76	.27	7.68	.64	.73
*F ₉ 80 lbs. Nit/A	1.32	1.33	.65	1.27	1.02	.70	.87	.65	.69	.86	.62	.51	10.49	.87	.99
Sum	7.42	6.24	6.03	5.07	6.13	3.61	5.26	5.18	4.22	5.47	4.75	2.53	61.91		

* Nitrogen was applied in 2 applications 20 lbs./A and 60 lbs./A.

"Preliminary summary of intake rates of furrow and ring infiltrometers for a given site in a citrus orchard, LaVerne, California are shown in the following tabulation:

		Intake rates			
Time		Furrow	King infiltrometer		
			No. 1		No. 2
Hours	Ins./hour	Hours	Ins./hour	Hours	Ins./hour
-	-	0.5	0.52	0.4	0.63
1.2	0.35	1.0	.34	1.1	.38
1.6	1.51	1.9	.09	1.9	.26
2.1	.89	2.6	.10	2.9	.23
3.0	.91	3.2	.14	3.7	.18
4.0	.60	-	-	4.9	.24
5.3	.52	5.7	.14	6.3	.09
8.0	.48	7.2	.14	8.4	.08
10.0	.40	10.2	.09	11.5	.09
12.9	.33	14.5	.09	16.0	.06
24.0	.32	22.0	.09	24.0	.04 "

Irrigation Studies - Fred M. Tileston, Ontario, Oregon.-"While taking the weights last spring and again this fall, we discovered that if we used lubricating oil on the parts of the improved Pomona sampler this oil would cause dirt to collect on the parts and cause the device to be extremely hard to take apart after the sample had been drawn from the ground. We had fallen into the practice of leaving the equipment in a wiped dry condition, including the brass cylinder which is enclosed behind the driving tip of the improved Pomona sampler but when we found that the volume weights of the first foot were relatively high we were dubious of the results, although the replicas were quite uniform. We were quite careful in taking the samples and were certain that we had not compacted the core with the driving head of the sampler but to further check our work we returned to the field and took volume weights in exactly the same location as before with the same number of replicas but with this difference in our procedure, we oiled the inside of the brass cylinder which holds the soil core, so the sample could slide easily into the cylinder. Our results when tabulated checked with reasonable accuracy those which had been secured in the spring. We concluded that there was enough wall friction as the earth core slid into the cylinder to partially compact the soil sample while it was being taken when the cylinder was left in a wiped dry condition. The volume weights taken in the deeper layers of the profile were consistent and checked with those taken in the spring. There seems to be enough free water in the deeper profiles to lubricate the sample so little or no wall friction occurs as the sample is being taken."

Silt Studies - Dean W. Bloodgood, Austin, Texas.-"The Rio Grande has been carrying a considerable silt load during most of the summer, although very little of it has been contributed by Texas streams. It is probable that most of it comes from Mexican streams. The main canal for the Eagle Pass Irrigation District (approximately 100 miles in length, starts from a diversion from the Rio Grande about 12 miles below Del Rio) has also been carrying an unusual amount of silt. Some of the new ditches that have been constructed during the past 15 months near the lower end of the district have been filled with silt, so that their carrying capacity has been reduced as much as 50 per cent in some places. It was anticipated and estimated these ditches would not require cleaning and maintenance for three to five years. As a result of the unusual silt situation we have started a preliminary study of the silting of irrigation canals. The present studies consist of obtaining water samples for silt determinations at four locations along the Main Canal. One location was established at the headworks (just below diversion from the Rio Grande); another one about 35 miles from headworks and at junction of a canal going to power house (Central Power & Light); another one just east of Eagle Pass where U. S. Highway 85 crosses main canal (about 45 miles from headworks); and another one just south of El Indio (about 70 or 80 miles from the headworks.)"

Comparison of wind movement recorded by two anemometers at two different heights at Texas Agricultural Experiment Substation No. 14, Sonora, Texas - Dean W. Bloodgood, Austin, Texas.-"The data contained in the following table shows the effect of two different heights or elevations of anemometer installations on wind movement. The standard installation (adopted by the U. S. Weather Bureau) is approximately 2 feet above the ground. While the one that has been used at the station for a number of years is about 18 feet above the ground.

"For a three-month period, May, June and July, 1950, the difference in wind movement between the two anemometer installations is 9275 miles. In other words the 18 foot height installation is about 113 per cent greater than the recognized standard installation nearer the ground.

"Most plant and animal life are affected by the natural elements near the ground. Wind movement is one of the big factors affecting the transpiration and evaporation losses of moisture used by plants. Climatological data as used in agriculture should be obtained in the natural habitat of plant, animal, insect, and any other life near the ground surface.

Comparison of Anemometer Readings at Two Different Elevations at the Texas
Agricultural Experiment Substation No. 14, Sonora, Texas

Date	Regular installation ^{1/} Height above ground- center of cups: 1.75 feet	Station installation ^{2/} Height above ground- center of cups: 18.25 feet	Difference between the two anemometers	Difference between regular and station installations
1950	Total Wind Movement	Total Wind Movement	Wind move- ment	
	Miles	Miles	Miles	Percentage
May	2713	5930	3217	119
June	2831	6130	3299	117
July	2671	5430	2759	103
Mean	2738	5830	3092	113

^{1/} Standard Weather Bureau installation and specifications (new anemometer).

^{2/} Present installation at the Station (old anemometer). No similar installation at other substations in Texas.

The use of the old and new types of anemometers might cause a small variation in the difference of data.

Standard Climatological Station Plans - Dean W. Bloodgood, Austin, Texas. - "During the month we completed all plans for the standardization of climatological stations at the Texas Agricultural Experiment Substations and at other locations in Texas. (Sets of these plans accompanied the report submitted by Dean Bloodgood. If anyone is interested in examining a set of the plans, kindly write Bloodgood.) Suggestions or criticism are welcome."

